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NSB KINGS BAY
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TECHNICAL REVIEW COMMITTEE MEETING AGENDA AND SLIDES 24 FEBRUARY 1993
NSB KINGS BAY GA
2/24/1993
TECHNICAL REVIEW COMMITTEE

AGENDA

TECHNICAL REVIEW COMMITTEE
24 FEBRUARY 1993

1. INTRODUCTION
2. MINUTES OF LAST MEETING
3. INSTALLATION RESTORATION PRESENTATION
BY ABB ENVIRONMENTAL SERVICES INC.
4. STATUS OF COMMUNITY RELATIONS PLAN
AND ADMINISTRATIVE RECORD
5. COST IMPACTS ON HOME OWNERS
6. DISCUSSION/CONCLUSIONS

**Slide Presentation
Technical Review Comittee
24 February 1993**

Naval Submarine Base
Kings Bay, Georgia
CTO 094

TRC SESSION

24 FEBRUARY 1993

NSB KINGS BAY GEORGIA

SITE 11 - OLD CAMDEN COUNTY LANDFILL

- INTERIM CORRECTIVE MEASURES**
- SCREENING INVESTIGATION**
- DRAFT FINAL REPORT**
- TECHNICAL REVIEW COMMITTEE SESSION**



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AGENDA

**EXTENT OF GROUNDWATER
CONTAMINATION**

CONCENTRATION OF CONTAMINANTS

MIGRATION OF CONTAMINANTS IN AIR AND SOIL

POTENTIAL HEALTH RISKS

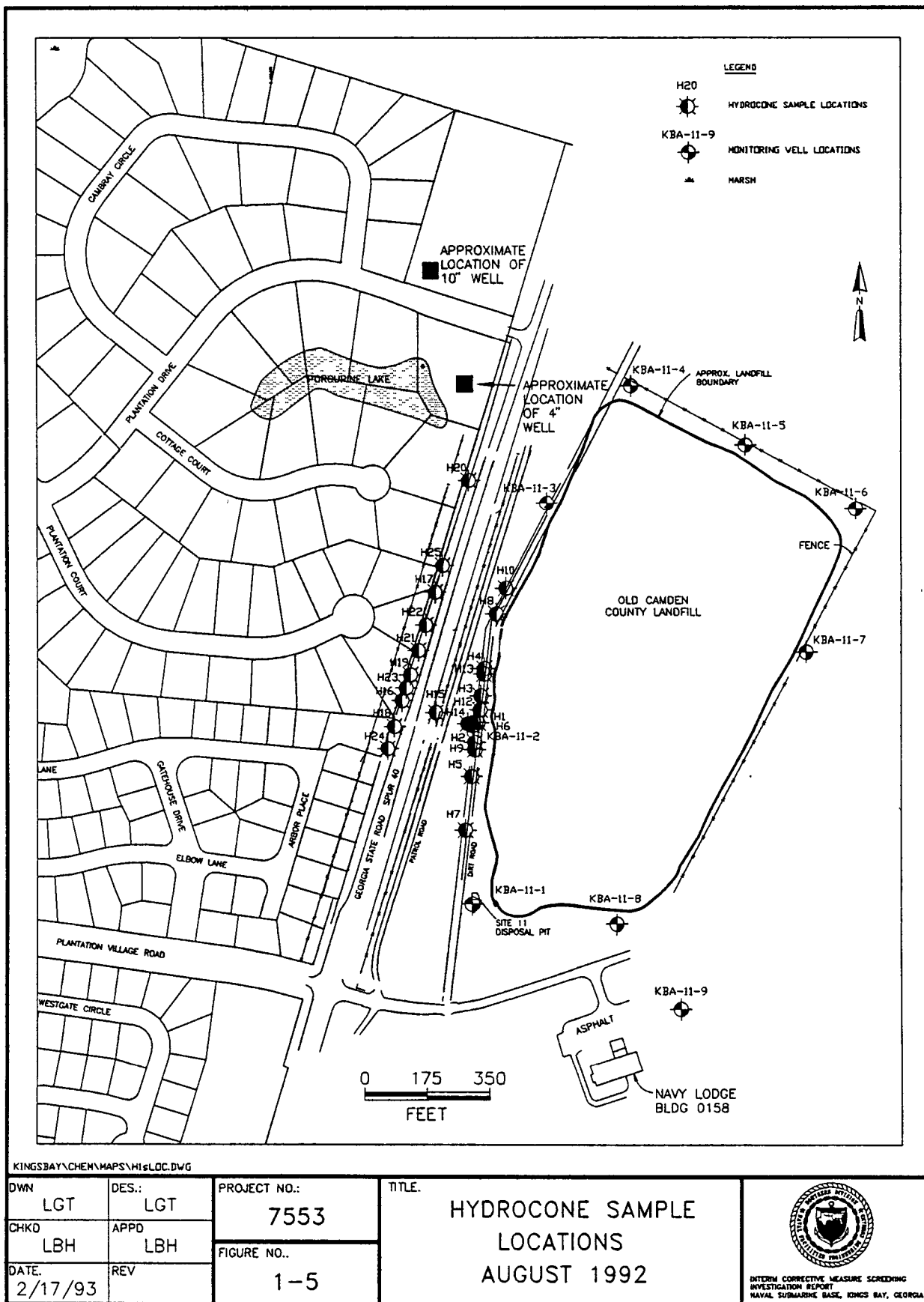
SUMMARY AND RECOMMENDATIONS

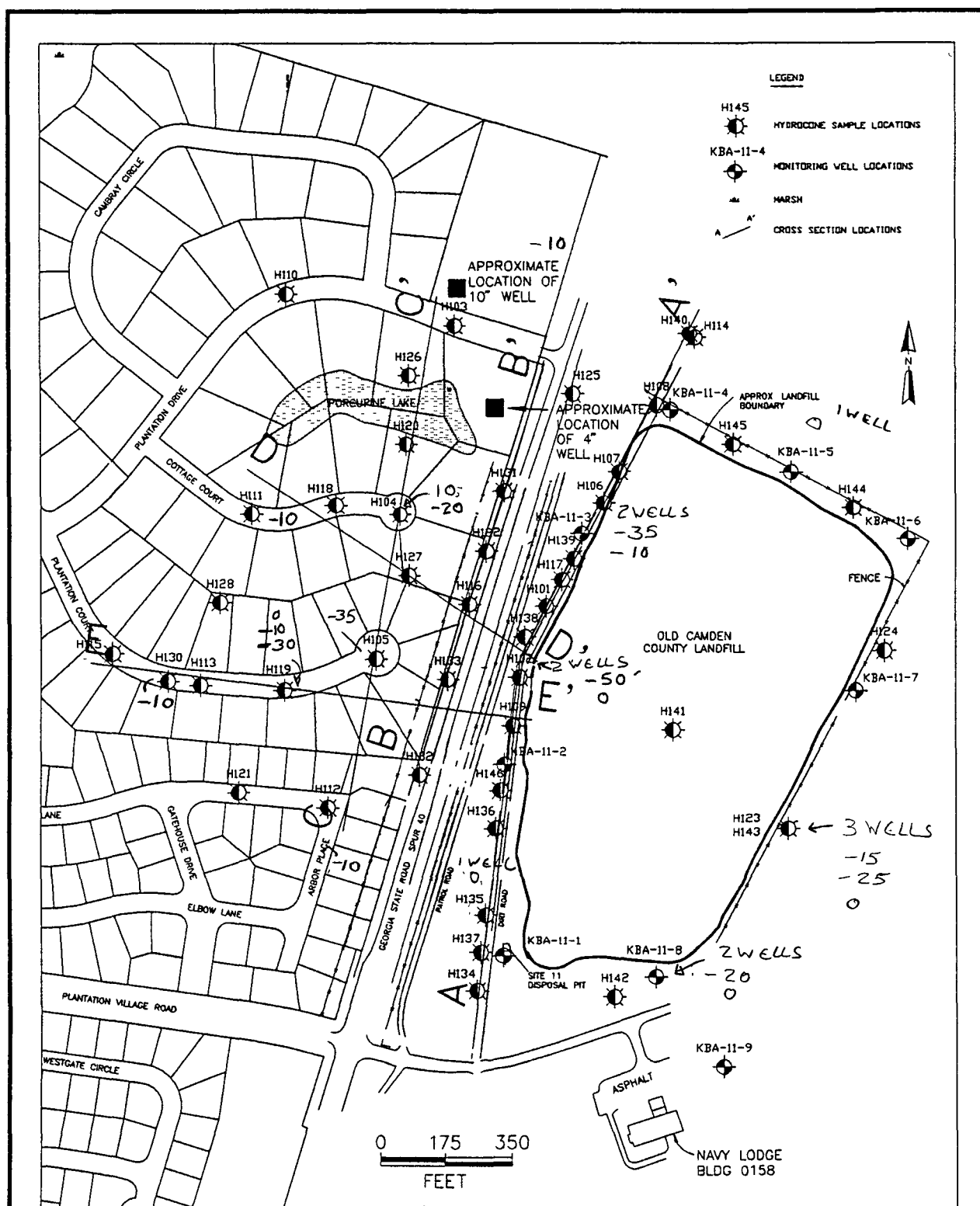


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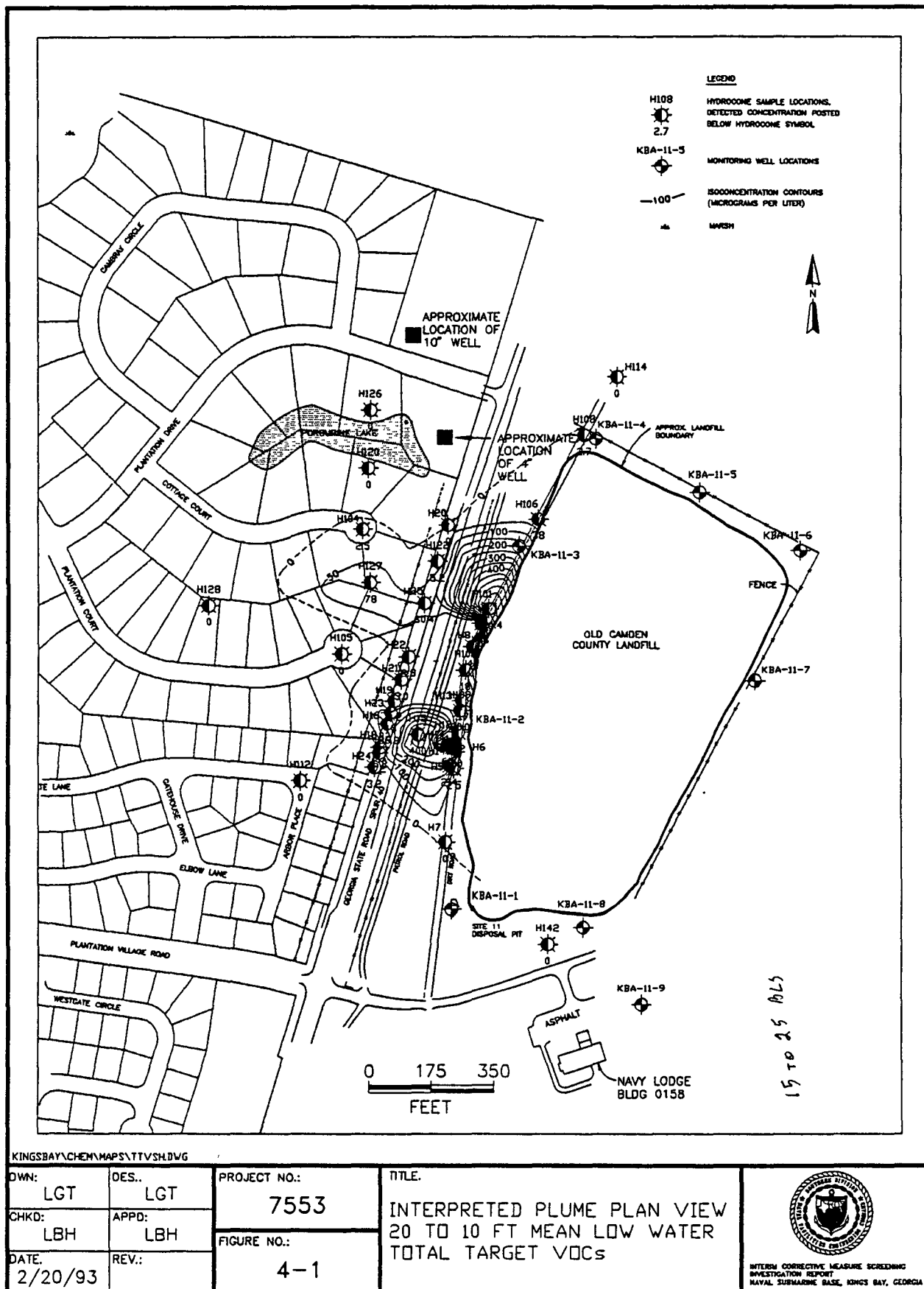


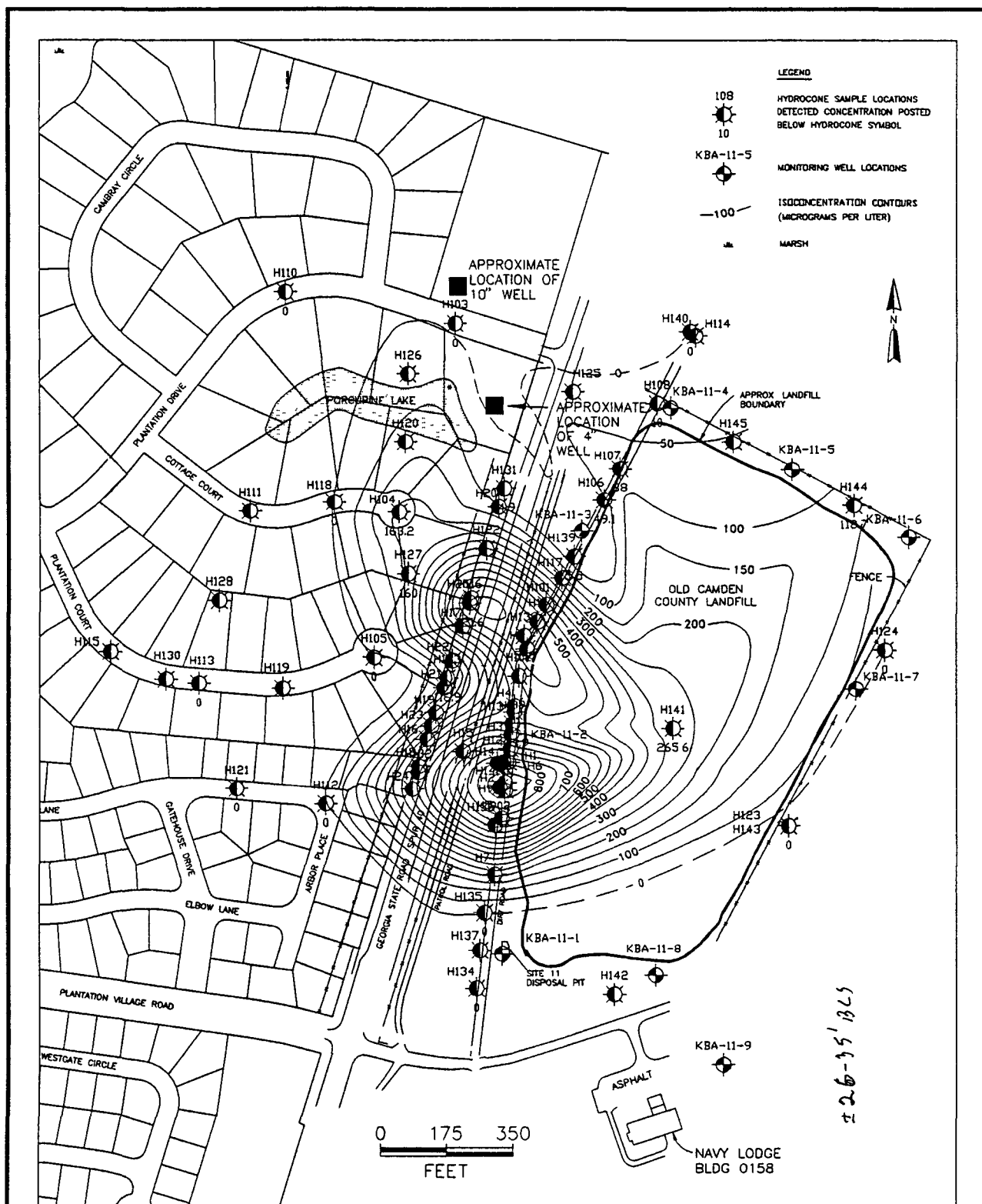
KINGSBAY\CHEN\MAPS\H100sLoc.DWG

OWN:	DES.	PROJECT NO.	TITLE.
LGT	LGT	7553	HYDROCONE SAMPLE LOCATIONS
CHKD:	APPD	FIGURE NO	OCTOBER 1992
LBH	LBH	2-2	
DATE.	REV..		
2/17/93			




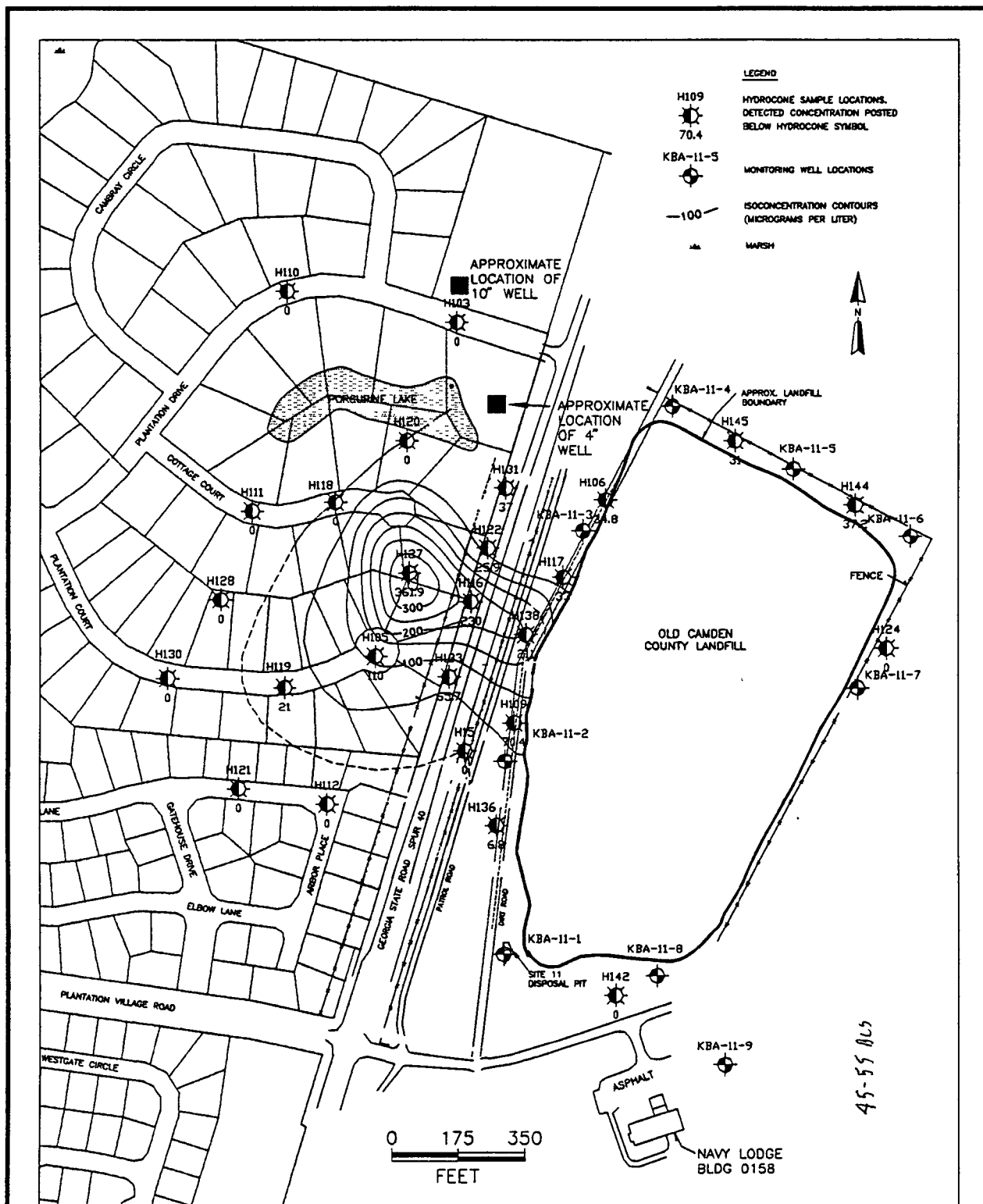
INTERIM CORRECTIVE MEASURE SCREENING
INVESTIGATION REPORT
NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA





KINGSBAY\CHEM\MAPS\TVMIDA.DWG

DWN: LGT	DES LGT	PROJECT NO. 7553	TITLE INTERPRETED PLUME PLAN VIEW 5 TO -5 FEET MEAN LOW WATER TOTAL TARGET VOCs	 INTERIM CORRECTIVE MEASURE SCREENING INVESTIGATION REPORT NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA
CHKD KMH	APPD: LBH	FIGURE NO. 4-2		
DATE 2/19/93	REV..			



KINGSBAY\CHEN\MAPS\TTV\DEEP.DWG

DWN: LGT	DES.: LGT	PROJECT NO.: 7553	TITLE: INTERPRETED PLUME PLAN VIEW -10 TO -20 FT MEAN LOW WATER TOTAL TARGET VOCs
CHKD. KMH	APPD: LBH	FIGURE NO.: 4-1	
DATE: 2/20/93	REV.: 		



INTERIM CORRECTIVE MEASURE SCREENING
INVESTIGATION REPORT
NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA

AGENDA

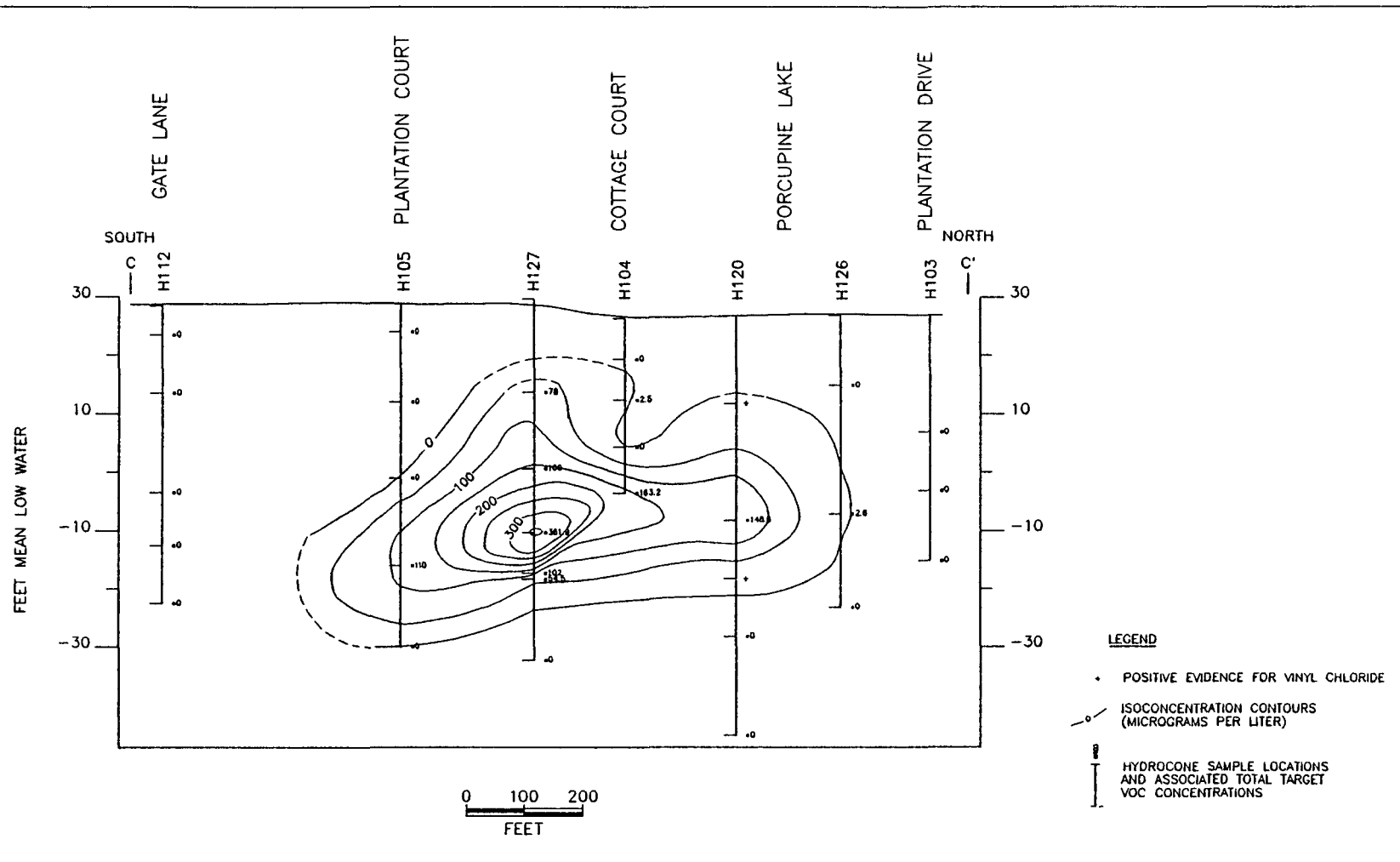
- EXTENT OF GROUNDWATER CONTAMINATION
- CONCENTRATION OF CONTAMINANTS
- MIGRATION OF CONTAMINANTS IN AIR AND SOIL
- POTENTIAL HEALTH RISKS
- SUMMARY AND RECOMMENDATIONS



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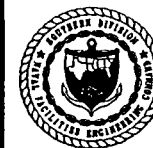
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KINGSBAY\CHEM\MAPS\SEC-CF DWG

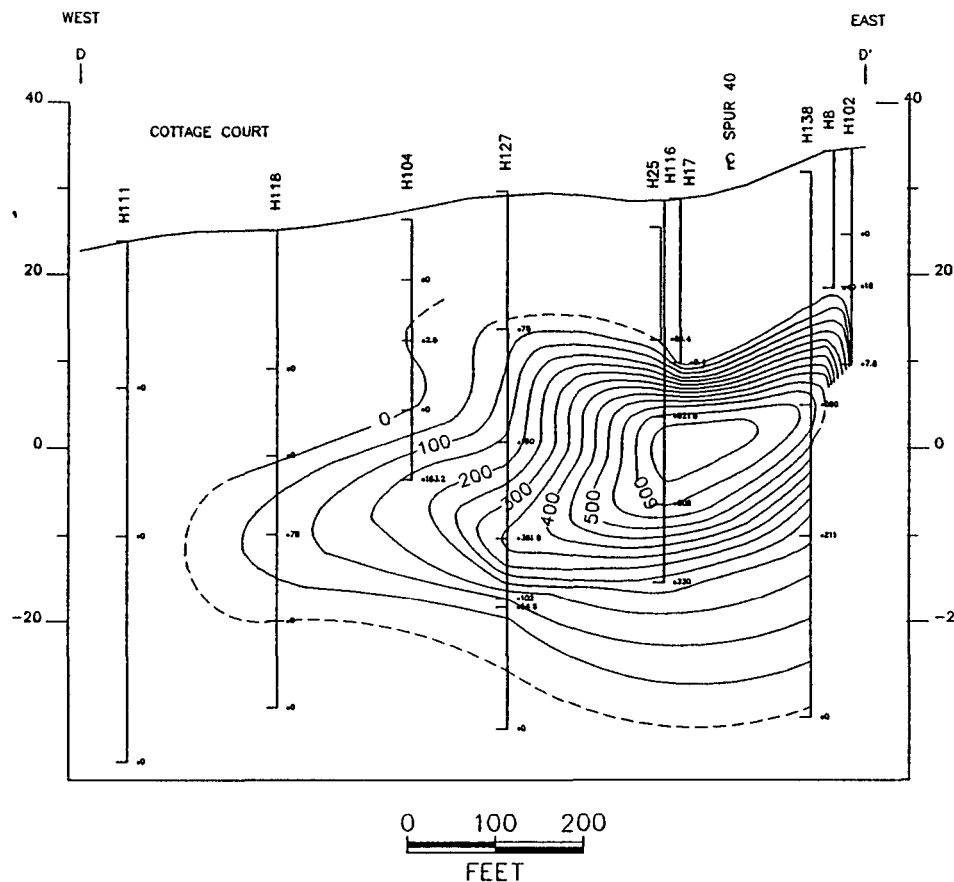
DWN. LGT	DES. LGT	PROJECT NO. 7553	TITLE CROSS SECTION C-C' TOTAL TARGET VOCs ON-SITE ANALYTICAL DATA
CHKD. KMH	APPD LBH	FIGURE NO. 4-6	
DATE 2/17/93	REV		



INTERIM CORRECTIVE
MEASURE SCREENING
INVESTIGATION REPORT

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

FEET MEAN LOW WATER



LEGEND

ISOCONCENTRATION CONTOURS
(MICROGRAMS PER LITER)

HYDROPHONE SAMPLE LOCATIONS
AND ASSOCIATED TARGET
VOC CONCENTRATIONS

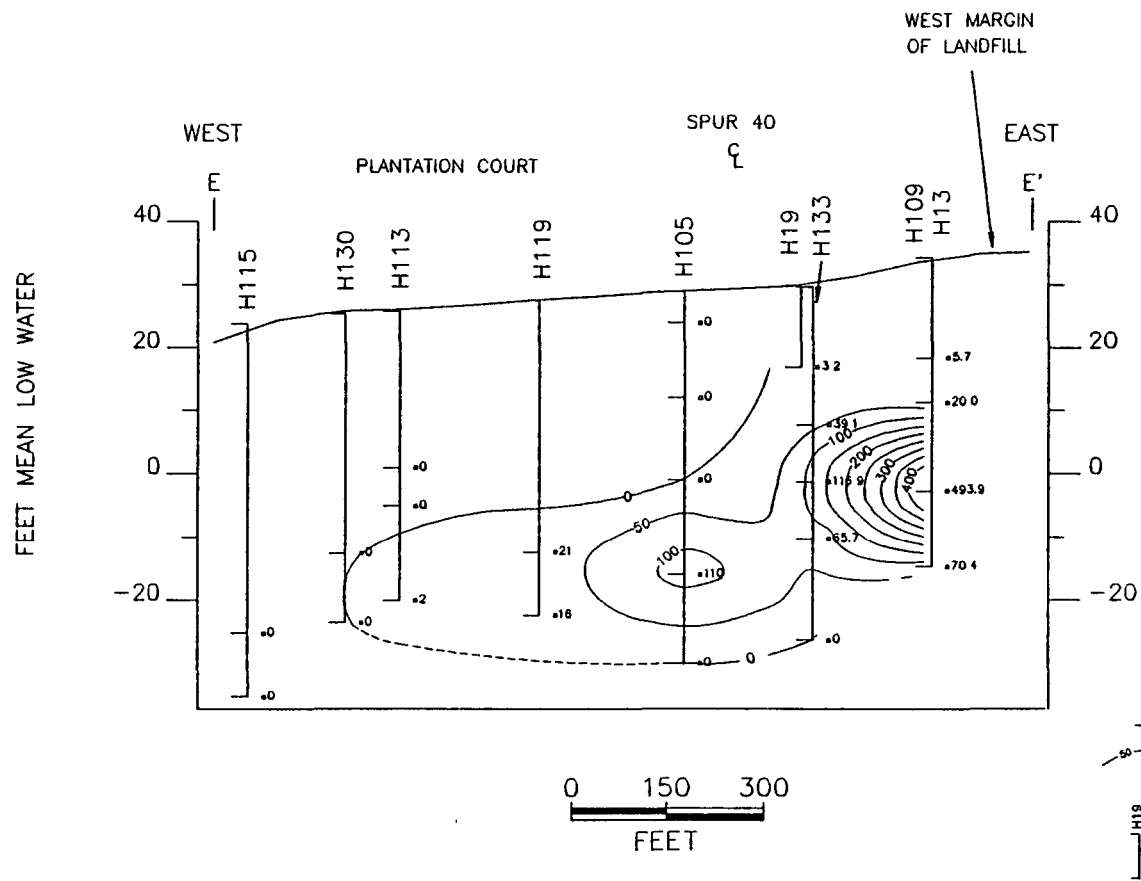
KINGSBAY\CHEM\MAPS\SEC-DF DWG

DWN LGT	DES LGT	PROJECT NO 7553	TITLE CROSS SECTION D-D' TOTAL TARGET VOCs ON-SITE ANALYTICAL DATA
CHKD LBH	APPD LBH	FIGURE NO. 4-7	
DATE 2/18/93	REV.		



INTERIM CORRECTIVE
MEASURE SCREENING
INVESTIGATION REPORT

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA



KINGSBAY\CHEM\MAPS\SEC-EF2.DWG

DWN. LGT	DES: LGT
CHKD. LBH	APPD. LBH
DATE: 2/16/93	REV.

PROJECT NO: 7553
FIGURE NO. 4 - 8

TITLE:
CROSS SECTION E-E'
TOTAL TARGET VOCs
ON-SITE ANALYTICAL DATA



INTERIM CORRECTIVE
MEASURE SCREENING
INVESTIGATION REPORT

NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA

VOCs DETECTED

SOLVENTS

VINYL CHLORIDE	4-METHYL-2-PENTANONE
DICHLOROETHENE	2-BUTANONE
TRICHLOROETHENE	2-HEXANONE
TETRACHLOROETHENE	1,2-DICHLOROPROPANE
DICHLOROETHANE	

FUEL RELATED VOLATILE ORGANIC COMPOUNDS

BENZENE	TOLUENE
ETHYLBENZENE	XYLENE
CHLOROBENZENE	DICHLOROBENZENE



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AGENDA

EXTENT OF GROUNDWATER CONTAMINATION

CONCENTRATION OF CONTAMINANTS

**MIGRATION OF CONTAMINANTS
IN AIR AND SOIL**

POTENTIAL HEALTH RISKS

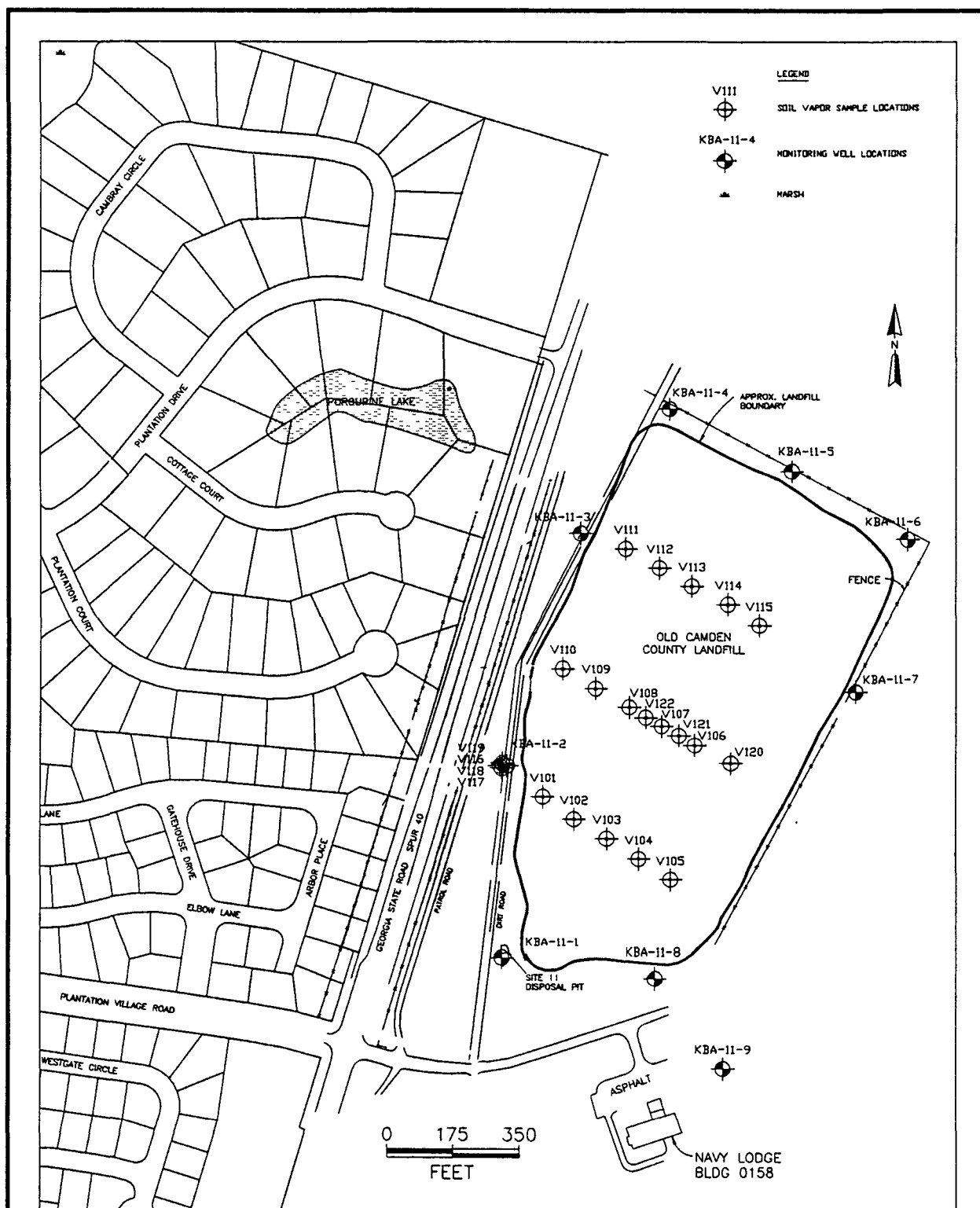
SUMMARY AND RECOMMENDATIONS




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KINGSBAY\CHEM\MAPS\V100sLoc.DWG		PROJECT NO.		TITLE. SOIL VAPOR SAMPLE LOCATIONS	 INTERIM CORRECTIVE MEASURE SCREENING INVESTIGATION REPORT NAVAL SUBMARINE BASE, KINGS BAY, GEORGIA
DWN. LGT	DES. LGT	7553	FIGURE NO..		
CHKD. LBH	APPD. LBH	2-3			
DATE 2/19/93	REV.				

AGENDA

EXTENT OF GROUNDWATER CONTAMINATION

CONCENTRATION OF CONTAMINANTS

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SUMMARY AND RECOMMENDATIONS



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FOUR BASIC STEPS OF A HUMAN HEALTH RISK ASSESSMENT

- IDENTIFY THE CONTAMINANTS
PRESENT**
- DETERMINE THE EXPOSURE
POTENTIAL**
- EVALUATE THE TOXICITY OF
THE CONTAMINANTS**
- ESTIMATE THE RISK ASSOCIATED
WITH EXPOSURE**



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IDENTIFY THE CONTAMINANTS PRESENT

**19 CONTAMINANTS PRESENT IN
THE GROUNDWATER**

**NO CONTAMINANTS DETECTED IN
THE PORCUPINE LAKE**

**NO CONTAMINANTS DETECTED IN
THE AIR IN THE CROOKED RIVER
PLANTATION SUBDIVISION**

**THEREFORE, ONLY THE CONTAMINANTS IN
THE GROUNDWATER WERE CONSIDERED IN
THE RISK ASSESSMENT.**



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WHAT ARE THE CONTAMINANT LEVELS PRESENT?

☐ 11 CONTAMINANTS WERE DETECTED AT LEVELS LESS THAN 50 PARTS PER BILLION;

- | | |
|--|---|
| <input type="checkbox"/> BENZENE | <input type="checkbox"/> TRANS-1,2-DICHLOROETHENE |
| <input type="checkbox"/> CHLOROBENZENE | <input type="checkbox"/> 1,2-DICHLOROPROPANE |
| <input type="checkbox"/> CARBON DISULFIDE | <input type="checkbox"/> ETHYL BENZENE |
| <input type="checkbox"/> 1,4-DICHLOROBENZENE | <input type="checkbox"/> TETRACHLOROETHENE |
| <input type="checkbox"/> 1,1-DICHLOROETHANE | <input type="checkbox"/> TRICHLOROETHENE |
| <input type="checkbox"/> 1,2-DICHLOROETHANE | |

☐ 7 CONTAMINANTS DETECTED AT LEVELS LESS THAN 1 PART PER MILLION;

- | | |
|--|---|
| <input type="checkbox"/> ACETONE | <input type="checkbox"/> METHYL ISOBUTYL KETONE |
| <input type="checkbox"/> METHYL ETHYL KETONE | <input type="checkbox"/> TOLUENE |
| <input type="checkbox"/> METHYL BUTYL KETONE | <input type="checkbox"/> XYLENES |
| <input type="checkbox"/> VINYL CHLORIDE | |

☐ 1 CONTAMINANT DETECTED AT A LEVEL GREATER THAN 1 PART PER MILLION

- ☐ CIS-1,2-DICHLOROETHENE



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EXPOSURE SCENARIO USED IN THE RISK ASSESSMENT

(CONTINUED)

- ☐ **3 POTENTIAL USES FOR THE GROUNDWATER**
 - ☐ **WATER FOR IRRIGATION SYSTEMS**
 - ☐ **WASHING OF OUTDOOR ITEMS**
 - ☐ **FILLING BACKYARD SWIMMING POOLS
(ADULT AND CHILDREN'S WADING POOLS)**

**NOTE: USE OF THE GROUNDWATER AS A
DRINKING WATER SOURCE WAS
NOT CONSIDERED A RELEVANT
EXPOSURE PATHWAY**



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EXPOSURE SCENARIO USED IN THE RISK ASSESSMENT

(CONTINUED)

3 POTENTIAL EXPOSURE ROUTES FOR THE CONTAMINANTS IN THE GROUNDWATER

- INHALATION OF CHEMICALS RELEASED FROM THE
WATER DURING IRRIGATION**
- INCIDENTAL INGESTION DURING SWIMMING ACTIVITY
OR WHEN BRIEFLY EXPOSED TO IRRIGATION SPRAY
OR SPLASHED INTO MOUTH DURING WASHING ACTIVITIES**
- DERMAL ABSORPTION DURING SWIMMING ACTIVITY
OR DURING BRIEF EXPOSURE TO IRRIGATION SPRAY
OR DURING WASHING ACTIVITIES**



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EXPOSURE SCENARIO USED IN THE RISK ASSESSMENT

(CONTINUED)

INHALATION:

- 1. A STUDY AREA OF 600 FT. BY 1000 FT.
18 IRRIGATION SYSTEMS IN THE STUDY AREA.**
- 2. ALL 18 IRRIGATION SYSTEMS USED 350 DAYS
PER YEAR FOR 2 HOURS PER DAY.**
- 3. USEPA SCREEN AIR MODEL USED TO CALCULATE
24 HOUR AVERAGE AIR CONCENTRATIONS FOR
CONTAMINANTS.**
- 4. RESIDENTS EXPOSED TO 24 HOUR AVERAGE AIR
CONCENTRATION CALCULATED BY SCREEN FOR
350 DAYS PER YEAR.**



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EXPOSURE SCENARIO USED IN THE RISK ASSESSMENT

(CONTINUED)

INCIDENTAL INGESTION:

SWIMMING ACTIVITY OCCURS 88 DAYS PER YEAR FOR 4 HOURS PER DAY (USEPA, 1992).

CHILDREN'S WADING POOL ASSUMED TO BE FILLED WITH NEW WATER FOR EACH OCCASION WHILE ADULT POOL REMAINS FULL BETWEEN SWIMMING EVENTS. THEREFORE, WATER CONCENTRATION OF CONTAMINANTS 10 TIMES HIGHER IN CHILDREN'S WADING POOL THAN IN ADULT POOL DUE TO VOLATILIZATION OF CONTAMINANTS IN ADULT POOL.

DURING EXPOSURE TO IRRIGATION SPRAY AND DURING WASHING OF OUTDOOR ITEMS. OCCURS 30 TIMES PER YEAR FOR A PERIOD OF 10 MINUTES PER EVENT.



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EXPOSURE SCENARIO USED IN THE RISK ASSESSMENT

(CONTINUED)

DERMAL ABSORPTION:

OCCURS DURING SWIMMING ACTIVITY, EXPOSURE TO IRRIGATION SPRAY OR WASHING OF OUTDOOR ITEMS.



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EVALUATE THE TOXICITY OF THE CONTAMINANTS

- ☐ **USE USEPA TOXICITY DATA FOR CARCINOGENIC (CANCER) EFFECTS AND NON-CARCINOGENIC EFFECTS.**

- ☐ **7 CARCINOGENS**

BENZENE
1,4-DICHLOROBENZENE
1,2-DICHLOROETHANE
1,2-DICHLOROPROPANE

PERCHLOROETHENE
TRICHLOROETHENE
VINYL CHLORIDE

- ☐ **ONLY BENZENE AND VINYL CHLORIDE ARE CONFIRMED HUMAN CARCINOGENS. THE REST HAVE INCONCLUSIVE OR NO HUMAN DATA TO SUGGEST THAT THEY ARE CARCINOGENIC IN MAN.**

- ☐ **9 NON-CARCINOGENS**

THE TOXIC EFFECTS THAT REFERENCE DOSES ARE BASED UPON ARE FETOTOXICITY (2), CENTRAL NERVOUS SYSTEM EFFECTS (4), LIVER OR KIDNEY DAMAGE (8), CHANGES IN BLOOD (2), NOSE IRRITATION OR DAMAGE (2) AND NONE (1). ONLY TWO EFFECTS ARE BASED UPON HUMAN DATA, ALL OTHERS ON ANIMAL DATA.



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LINEAR LOW-DOSE CANCER RISK EQUATION

$$\text{Risk} = \text{LADD} \times \text{CSF}$$

Where:

Risk = A Unitless Probability (e.g., 2×10^{-5}) of an Individual Developing Cancer Above the Background Incidence of 20-25%

LADD = Lifetime Adjusted Daily Dose; The Chronic Daily Intake Averaged Over 70 Years (mg/kg-day); and

CSF = Cancer Slope Factor, Expressed in (mg/kg-day)⁻¹



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ESTIMATE THE CARCINOGENIC RISKS ASSOCIATED WITH CONTAMINANT EXPOSURE

LIFETIME TOTAL MAXIMUM UPPER-BOUND CARCINOGENIC RISKS FOR THE RISK ASSESSMENT EXPOSURE SCENARIOS

HUMAN RECEPTOR	3 YEARS	6 YEARS	30 YEARS
CHILD	8×10^{-5}	1×10^{-4}	-----
ADULT	2×10^{-7}	-----	2×10^{-7}

----- DENOTES NOT CALCULATED

FOR COMPARISON THE USEPA PROVIDES A TARGET RISK RANGE OF 1×10^{-4} (1 IN 10,000) TO 1×10^{-6} (1 IN 1,000,000). ALL RISKS FALL WITHIN OR BELOW THIS RISK RANGE.

WITH THE INFORMATION PRESENTLY AVAILABLE, THE SCREENING RISK EVALUATION SUGGESTS THAT NO ADVERSE CARCINOGENIC EFFECTS ARE EXPECTED DUE TO EXPOSURE TO THE CONTAMINANTS IN THE GROUNDWATER.



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ABB
ASEA BROWN BOVERI

NON-CANCER HAZARD INDEX (HI)

$$\text{HI} = \frac{\text{Exposure Dose (ED)}}{\text{Reference Dose (RfD)}}$$

**ED and RfD are Expressed in the Same Units (mg/kg/Day)
and Represent the Same Exposure Period
(Chronic, Sub-Chronic, Short-Term).**



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ESTIMATE THE NON-CARCINOGENIC RISKS ASSOCIATED WITH CONTAMINANT EXPOSURE

TOTAL HAZARD INDEX (HI) FOR THE RISK ASSESSMENT EXPOSURE SCENARIOS

HUMAN RECEPTOR	3 YEARS	6 YEARS	30 YEARS
CHILD	5.3	5.3	-----
ADULT	0.3	-----	0.3

----- DENOTES NOT CALCULATED

FOR COMPARISON, THE USEPA SUGGEST FURTHER ANALYSIS OF NON-CARCINOGENIC RISKS IF THE HI IS GREATER THAN 1.0. THIS DOES NOT MEAN THAT NON-CARCINOGENIC EFFECTS ARE MORE LIKELY TO OCCUR, JUST THAT FURTHER ANALYSIS NEEDS TO BE CONDUCTED.

WITH THE INFORMATION PRESENTLY AVAILABLE, THE SCREENING RISK EVALUATION SUGGESTS THAT NON-CARCINOGENIC EFFECTS WILL NOT OCCUR DUE TO EXPOSURE TO THE CONTAMINANTS IN THE GROUNDWATER



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RISKS THAT INCREASE PROBABILITY OF DEVELOPING CANCER BY ONE CHANCE IN A MILLION

Activity	Disease
Smoking 1.4 Cigarettes	Cancer, Heart Disease
Drinking 1/2 Liter of Wine	Cirrhosis of the Liver
Flying 6000 Miles by Jet	Cancer Caused by Cosmic Radiation
Living 2 Months in Average Brick Building	Cancer Caused by Natural Stone Radioactivity
One Chest X-ray Taken in a Good Hospital	Cancer Caused by Radiation
Living 2 Months with a Cigarette Smoker	Cancer, Heart Disease
Eating 100 Charcoal-Broiled Steaks	Cancer from Benzopyrene
Living 20 Years Near PVC Plant	Cancer Caused by Vinyl Chloride (1976 Standard)

Source: Adapted from R. Wilson, Analyzing the Risks of Daily Life, *Technology Review*, 81 (1979). See also R. Wilson and E.A.C. Crouch, Risk Assessment and Comparison: an Introduction, *Science*, 236, 267-270 (1987).



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AGENDA

- EXTENT OF GROUNDWATER CONTAMINATION**
- CONCENTRATION OF CONTAMINANTS**
- MIGRATION OF CONTAMINANTS IN AIR AND SOIL**
- POTENTIAL HEALTH RISKS**
- SUMMARY AND RECOMMENDATIONS**



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SUMMARY AND CONCLUSIONS:

- ☐ THE SCREENING RISK EVALUATION SUGGESTS THAT NO ADVERSE HEALTH EFFECTS IN THE RESIDENTS OF THE CROOKED RIVER PLANTATION SUBDIVISION ARE EXPECTED DUE TO EXPOSURE TO THE CONTAMINANTS IN THE GROUNDWATER.
- ☐ HOWEVER, IF RESIDENTS SHOULD CHOOSE TO FURTHER MINIMIZE THEIR POTENTIAL RISKS, THEY CAN REFRAIN FROM PRACTICES SUCH AS PLAYING IN THIS WATER OR FILLING SWIMMING POOLS WITH THIS WATER.
- ☐ WE ARE PRESENTLY AWAITING CONCURRENCE FROM USEPA REGION IV AND GEORGIA EPD.



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